

WASHINGTON DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
FRESHWATER MONITORING UNIT
STREAM DISCHARGE TECHNICAL NOTES

STATION ID: 40A070
STATION NAME: Squilchuck Creen below Picher Canyon
WATER YEAR: 2009
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Introduction

Watershed Description

Squilchuck Creek is a tributary of the Columbia River, located south of the city of Wenatchee, Washington. The drainage extends from the Columbia River to Mission Ridge (elevation 6,280 feet), and is bounded by Dry Creek to the north and Stemilt Creek to the south. The upper Squilchuck basin is predominantly forested and includes the Mission Ridge ski area and Squilchuck State Park. The lower portion of the basin is mostly undeveloped shrub-steppe with some residential and agricultural development along the stream corridor. Annual precipitation averages 20.8 inches, with a substantial portion falling in the upper basin as snow. Snow-making operations are conducted at the ski resort.

Gage Location

The Squilchuck Creek below Pitcher Canyon stream gage is located on the left bank of Squilchuck Creek off Squilchuck Road above the Lovitt Tailings Pond (inactive) at RM 2.0. At this location, the stream channel is a lined with concrete.

Table 1.

| | |
|---------------------------------------|----------------|
| Drainage Area (square miles) | 26.43 |
| Latitude (degrees, minutes, seconds) | 47° 22' 42" N |
| Longitude (degrees, minutes, seconds) | 120° 18' 51" W |

Discharge

Table 2. Discharge Statistics.

| | |
|---|------|
| Mean Annual Discharge (cfs) | 4.4 |
| Median Annual Discharge (cfs) | 3.2 |
| Maximum Daily Mean Discharge (cfs) | 20 |
| Minimum Daily Mean Discharge (cfs) | 0.60 |
| Maximum Instantaneous Discharge (cfs) | 22 |
| Minimum Instantaneous Discharge (cfs) | 0.40 |
| Discharge Equaled or Exceeded 10 % of Recorded Time (cfs) | 11 |
| Discharge Equaled or Exceeded 90 % of Recorded Time (cfs) | 1.6 |
| Number of Days Discharge is Greater Than Range of Ratings | 0 |
| Number of Days Discharge is Less Than Range of Ratings | 3 |

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

Narrative

In water year 2009, seven discharge measurements were conducted at a range of flows from 0.61 cfs to 10.45 cfs. The stream was ice-impacted intermittently throughout the winter months. Ice was responsible for all the unreported days in this water year. Peak discharges occurred in May as snow melted in the upper portions of the basin; low flows were observed in early September.

Three days were not reported due to having one or more stage values lower than the range of ratings. All three of these days occurred during periods of phasing from one rating to another and were outside the range of one of the two ratings.

Error Analysis

Table 3. Error Analysis Summary.

| | |
|--|-------|
| Logger Drift Error (% of discharge) | 20.0% |
| Weighted Rating Error (% of discharge) | 8.4% |
| Total Potential Error (% of discharge) | 28.4% |

Rating Table(s)

Table 4. Rating Table Summary

| | | | |
|------------------------------|---------------------|----------------------|--------------------|
| Rating Table No. | 2 | 3 | 201 |
| Period of Ratings | 10/1/2008-11/6/2009 | 10/2/2008-03/23/2009 | 3/4/2009-6/30/2009 |
| Range of Ratings (cfs) | 0.66 to 32.3 | 0.93 to 64.6 | 0.31 to 64.6 |
| No. of Defining Measurements | 18 | 12 | 18 |
| Rating Error (%) | 10.8 | 8.6 | 10.8 |

| | | | |
|------------------------------|---------------------|--------------------|--|
| Rating Table No. | 101 | 301 | |
| Period of Ratings | 5/19/2009-9/30/2009 | 8/1/2009-9/30/2009 | |
| Range of Ratings (cfs) | 0.66 to 32.3 | 0.93-64.6 | |
| No. of Defining Measurements | 4 | 12 | |
| Rating Error (%) | 5.3 | 8.6 | |

| | | | |
|------------------------------|--|--|--|
| Rating Table No. | | | |
| Period of Ratings | | | |
| Range of Ratings (cfs) | | | |
| No. of Defining Measurements | | | |
| Rating Error (%) | | | |

Narrative

In water year 2009, the rating shifted frequently, with no more than two consecutive measurements falling on the same rating curve. Shifts in the rating appear to be driven by the accumulation and flushing of debris from behind the pipe extending into the stream from the gaging station. In some cases, these shifts could be tied to specific events (the falling limb of the spring runoff, for example); but in other cases, there was no definitive evidence in the record of when a shift occurred. It is likely that shifting occurred more frequently during some portions of the water than it was possible to account for because the shifts were more frequent than field observations. The uncertainty associated with frequent shifting is likely a major contributor to the total potential error.

Stage Record

Table 5. Stage Record Summary

| | |
|--|------|
| Minimum Recorded Stage (feet) | 4.60 |
| Maximum Recorded Stage (feet) | 5.45 |
| Range of Recorded Stage (feet) | 0.85 |
| Number of Un-Reported Days | 38 |
| Number of Days Qualified as Estimates | 180 |
| Number of Days Qualified as Unreliable Estimates | 0 |

Narrative

Thirty-eight days were unreported in water year 2009. All of these days were not reported because the channel was ice-impacted and the stage-discharge relationship was not valid.

A large number of days were qualified as estimates for this water year. Of the 179 days qualified as estimates, 153 were flagged as estimates by logger drift analysis. The remainder of the estimated days were between periods of ice-impacted data and the next ice-free stage observation. It should be noted that both of these conditions applied to many of the days qualified as estimates.

Modeled Discharge

Table 6. Model Summary

| | |
|--|------|
| Model Type (Slope conveyance, other, none) | None |
| Range of Modeled Stage (feet) | n/a |
| Range of Modeled Discharge (cfs) | n/a |
| Valid Period for Model | n/a |
| Model Confidence | n/a |

Surveys

Table 7. Survey Type and Date (station, cross section, longitudinal)

| Type | Date |
|------|------|
| None | N/A |

Activities Completed

No additional activities were conducted this water year.